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*E. rupium* Fabricius, a well-known European species, here recorded from northern British Columbia for the first time as a North American species.

*E. tenax* (Linne), now distributed over nearly the whole world, though formerly limited to the eastern hemisphere. The records for this species in North America go back only to 1870.

***Eristalis latifrons* Loew.**

This species has been considered as limited in its distribution to the western part in North America, where it has been listed from nearly all the western states east to Kansas, north into British Columbia and south into Mexico. During the summer of 1901 I took a number of specimens at Fargo, N. D., and supposed that this was about the eastern limit for the species. Later, on examining the collections in the American Museum of Natural History, I found specimens taken by Prof. W. M. Wheeler in Wisconsin. Within recent years, however, several specimens have been taken in the vicinity of New York City. The first of these, as far as my observations go, was taken near Brooklyn, N. Y., on July 15, 1908, by Mr. Geo. P. Engelhardt. Another was taken at Snake Hill, N. J., on July 16, 1911, by Mr. John A. Grossbeck, and I have seen others. These eastern specimens are indistinguishable from western ones.

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## THE DEER BOT-FLIES (GENUS *CEPHENOMYIA* LATR.)

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The discovery of adults of a North American species of *Cephenomyia* seems to justify some discussion of the history, taxonomy and biology of the genus:

There are four European species, all quite fully treated by Brauer in his classic "Monographie der Oestriden" of 1863. All live in the larval stages in the nasal passages, on the soft palate, at the base of the tongue, in the Eustachian tubes and pharynx of various members

of the deer family. *Cephenomyia rufibarbis* Mg. (name changed to *auribarbis* Mg. in the Paläarctic Catalogue on account of "page priority") is found in the stag; *ulrichii* Br., in the elk; *trompe* L., in the reindeer; and *stimulator* Clark in the roe (the Pal. Cat. also mentions *Cervus pygargus*). They are at times found in large numbers in the host; Brauer (p. 192) states that stags and roes dying in spring are often so badly infected that the bots must be a principal cause of their death.

From Patagonia Guérin described *Cephenomyia grandis* (Iconog. règne anim., 547, 1843 or earlier) from an adult, nothing being reported about its life history.

The preceding data include all the described species, outside North America, as far as the literature is known to the writer.

In North America only one doubtful adult has been mentioned up to the present, the one which was described from Georgia as *Æstrus phobifer* by Clark, Essay on Bots, 69, 1915. The description of this species was much too general and too brief to indicate the generic relations; Brauer, however, happened to get hold of an old portfolio of Meigen's drawings just as his Monograph was nearly printed, among which was a drawing labeled *Æstrus phobifer*. In the belief that Meigen had actually seen and drawn Clark's specimen, Brauer reproduces this sketch (pl. v, f. 11), with notes on page 291. The venation indicates a *Cephenomyia*, but the rest of the sketch hardly shows any characters. The century which has passed has brought no further light on the matter, and we can only refer the species to *Cephenomyia* with an interrogation mark as heretofore. In any case, it is not the same as the species herein described.

There are however several references to larvæ from North America in literature. On page 202 of his Monograph, Brauer mentions larvæ of *Cephenomyia ulrichii* Br. from throat of an elk in North America, sent him by Osten Sacken; as no North American adults are known, there must be considerable doubt of the specific identity of the species.

On page 211, Brauer describes two larvæ sent him from North America by Osten Sacken, taken from *Cervus macrotis* Say in the northwestern part of the United States (in copying the reference in my catalogue, I inadvertently introduced the word *by* before Say): in the index this species is called *Ceph. macrotis*, but no specific

name occurs in the text. Osten Sacken, Cat., 1878, 145, says the larvæ were from the throat of the deer.

In Zweifl. d. Kais., Mus. zu Wien, iii, 82, 1883, Brauer mentions a species occurring in the throat of *Cervus mexicanus* in Durango, Mexico; in the same series, vii, 547, 1893, Brauer and von Bergenstamm apply the name *Ceph. mexicana* to this undescribed larva.

Riley and Howard, Insect Life, i, 386, 1889, report larvæ sent in from California, taken from a "pocket under the jaw" of deer, and said to be common; referred doubtfully to *Cephenomyia*, but from the habit pretty certain to belong here.

The same, ii, 116, 1889, note occurrence of larvæ of this genus in nasal passages of man near San Bernardino, Cal.; more than 40 larvæ were removed.

The same, iii, 162, 1890, note on larvæ in the throats of hogs in West Virginia; doubtfully referred to this genus.

Mr. W. L. McAtee, of the Bureau of Biological Survey, Washington, writes under date of May 13, 1915, that his Bureau received this spring from Aragon, N. M., the larynx of a mule deer in which were a large number of the larvæ of a fly of this genus.

The behavior of adults is entertainingly described by Brauer, and as I have never seen the passage in English, I translate with some abridgement from his Monograph, pp. 184-187:

"The behavior of these flies is quite varied. Some species are very dull and sit in the cage for weeks without seeking liberty; others however, as soon as their wings are fully developed, begin to beat against the walls so vigorously that care must be taken not to let them live longer than necessary. One of the dullest kinds that I have observed is *Cephenomyia rufibarbis*, while *Cephenomyia stimulator* and *Pharyngomyia picta* are very active. The first, as one would expect, does not fly far from the haunts of its host, while the other two ascend high in the air and greet the mountain-climber as he gains the summit, even in the Alps, where they fly back and forth, pendulum-like, before him, and alight upon him. At lower temperatures they are more quiet, and as this condition usually prevails at summits, they are commonly found sitting on warm stones. On some days *Cephenomyia stimulator*, which more than the others ascends the highest Alpine summits, occurs in abundance at these heights, where many individuals dart wildly at each other or buzz close around

the warm rocks. Professor Zeller took this species on the high Mensa and on Spitzberg in the Riesengebirge; I have taken many specimens of it on our Schneeberg and the nearer but smaller Bisamberg, but among these were only three females. . . . On the occurrence of a storm the flies like other insects desert the peaks and hide in crevices or other protected places. But they are not afraid of a strong wind, and with astonishing endurance endeavor to maintain themselves at the top. The preference of these flies for rocky peaks, old towers and isolated triangulation pyramids is very useful to the entomologist, who can obtain them there, although elsewhere they would be extremely rare. We are indebted for the discovery of this habit to the entomologist Saxesen in the Harz. . . .

"The deposition of the larvæ I was once enabled to observe very closely in *Cephenomyia rufibarbis*. It was on a hot day in May, after a morning shower, and the air was still and sultry. In the warm sunshine these Cæstrids were flying and encircled in vertical arcs the heads of the deer [stag, *Hirsch*]. While the fly circled noiselessly, the deer followed it with its eye, stamped angrily, and often closed the nostrils and breathed heavily. Suddenly the fly darted at the open nostril, not alighting, but instantly turning back; this was repeated several times. The deer began to sneeze, struck out with its fore feet, attempted to scratch its nose with its hind foot and to rub it on its fore leg; at length it started to run, stopping in a short distance to sneeze, strike, scratch and rub as before. The fly was several times driven to the ground by the sneezing of the deer, but recovered itself with a loud buzz and flew slowly away.

"Even a single fly of this kind produces a marked effect upon a herd of deer; immediately the deer all prick up their ears, look up in the air and close their nostrils. While the *Cephenomyia* female flies among the herd, depositing her maggots one by one, a peculiar rhythmic movement passes over the animals, snorting and stamping followed by quiet, and this repeated three or four times, until the fly departs or the herd scatter into deep woods, when the same play is repeated with a nearby herd.

"The strong responsive movements of the host are explained by the fact that the fly deposits, each time she approaches the nasal opening, a drop of fluid with very active living larvæ; these attach themselves at once with their strong hooklets and thus induce the

violent sneezing. I satisfied myself of this by capturing a female fly, when by pressing the abdomen I could secure a drop of fluid with from 9 to 12 larvæ. The ejection occurred with force; whether this would be the case in life I will not say, but it is possible, as the female only approaches the host and does not alight. . . .

"*Cephenomyia trompe* deposits young like *rufibarbis*; I found young larvæ sticking to the hairs of the abdomen of a female in my collection."

*Generic Characters of Cephenomyia*.—Robust species with rather dense and long pile. Wing with apical crossvein, the cell open; posterior crossvein joining the fourth vein some distance before the beginning of the apical crossvein; fourth vein distinctly continued beyond the latter (see figure). Eyes rather widely separated in the male, more so in female; antennæ small, third joint very short, arista bare, thick at base, dorsally attached to third joint; ptilinal suture widely diverging to near the eyes below, antennal cavity small but deep, continued below as a narrow groove to the oral opening; mouthparts entirely concealed by the long pile, apparently not developed, but by removal of the hair a small proboscis and a pair of palpi are found.

The nearest ally, at least in North America, is *Hypoderma*, in which the posterior crossvein is almost continuous with the apical, there is no continuation of the fourth vein beyond the latter, there are two separate antennal cavities, etc. *Cuterebra* is much less pilose, the head especially being almost bare, the arista is plumose, fourth vein with a rounded bend, etc.

***Cephenomyia abdominalis*** new species. (Plate XI.)

Male.—A robust black species, thorax with yellow pile except a tuft of black over each wing; that on head yellow except on parafrontals, running somewhat down on parafacials; pile of abdomen black except on basal half or more of first segment (and in one of three a few pale hairs on fourth among the black); basal half of femora with long yellow pile behind.

The only known species with solid black pile on abdomen, beyond the first segment; differs from all the European species in not having conspicuous red, yellow or white pile on the abdomen, and in having no black pile on the thoracic dorsum except a tuft over the base of each wing.

Head black; front not very prominent, at vertex about one-fourth the entire width of head; middle stripe with yellow pile; the eyes diverge from each other rapidly below; in profile the bucca is about one-fourth as high as

the eye, but so concealed by dense yellow pile that it cannot be measured satisfactorily; face very wide, with long yellow pile (mixed a little with black above on one specimen); structure of antenna, face and mouth-parts as given above in generic characters; the yellow pile of face continues below to the occiput, but there is a line of black hairs immediately behind the eye.

Thorax shining black, showing through the pile over the middle; scutellum with long and dense yellow pile, which forms a long fringe behind.

Abdomen thick, rounded, shining black or with a tinge of violet, with dense, erect black pile not as long as the thoracic; four distinct ring-like segments, the fifth and sixth together somewhat disklike, and bearing anteriorly the clasping organs, which are normally concealed well forward in the venter.

Legs black, of moderate stoutness, black-haired except the basal part of the femora; claws black, pulvilli dark brown.

Wings strongly infuscated along the veins, and especially in the region from the anterior crossvein to the costa. Length, 14 mm.; of wing, 12 mm.

Three males, collected by Mr. Wm. T. Davis on White-Face Mountain, in the Adirondacks, New York; July 6 and 10, 1914. The type and one paratype are returned to Mr. Davis, the other paratype remains in the collection of the describer.

Mr. Davis lived at the base of the mountain for some days, making almost daily ascents to the summit; he says, "Along the trail there were several open places where the sun shone warmly, and where we found many insects, and I think the botflies." From the general resemblance to some woolly Syrphids (*Criorhina verbosa*, *Eristalis flavipes*), the botflies were not recognized at first as important, hence the exact locality was not remembered.

The figures in the plate have been retouched to bring out the yellow pile, which showed but little in the print.

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## MISCELLANEOUS NOTES.

### ***Silpha surinamensis* and *Creophilus villosus* as Predaceous Insects.**

—While at Wilmington in 1914, Mr. Ernest Shoemaker and I heard that a neighbor had killed a porcupine that had been found investigating an outhouse. We secured the animal and carried it to a nearby wood to serve as a bait for insects.

On the morning of July 11 we found many *Silpha surinamensis*, *Silpha americana* and *Creophilus villosus* about the remains. It was raining at the time. On the way home I visited the spot with

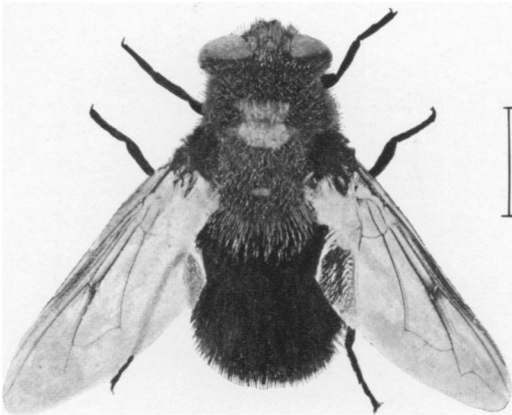
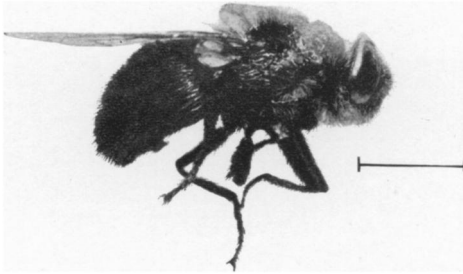


Photo by P. W. Mason.

Cephenomyia.